

- 65 -

## ABSTRACT

A method for pre-calibration of a laser micro-machining system to achieve alignment tolerances greater than the diffraction limit of an illumination wavelength. A blank is mounted in the system, such that the beam spot is incident on its top surface. Two marks  
5 are ablated in the blank. The centers of the marks are a predetermined distance apart. The blank is illuminated with light and imaged with a digital camera. The resulting image is scaled such that each pixel has a width corresponding to a distance on the imaged surface, which is less than half of the illumination wavelength. The number of pixels between the centers of the marks determines this distance. The locations of the marks in  
10 the image are determined and a coordinate system is defined for surfaces imaged by the digital camera. Coordinates of the beam spot in this coordinate system are also determined using the second mark.